claims 16 – 19 were rejected under 35 USC § 103(a) as being unpatentable over *Matsui* or *Mizutani*, et. al. in view of Rushing (U.S. Patent No. 6, 331,832). Applicants have added Claim 29 to more clearly define the scope of applicant's invention. The independent claims remaining in the application are claims 1, 5 and 16. Favorable reconsideration is requested.

What will be first addressed are the 35 U.S.C. § 102(b) rejections, followed by the rejections under 35 U.S.C. § 103(a).

Independent Claim 1 is directed to a semi-conductor device comprising a buried grating, a waveguide core, an absorption section, and a tuning section. A notable feature of the device of claim 1 is the tuning section. This allows, as described in the specification, the absorption of a spectrum of wavelengths by the absorption section. The particular wavelength being absorbed at any given time by the absorption section is a function of an electrical input to the tuning section. The Examiner asserts *Matsui* against claims 1 and 2. Applicants respectfully traverse these assertions inasmuch as *Matsui* does not teach a tuning section.

*Matsui* is a Japanese language patent and the Examiner was therefore restricted to the English abstract and the figures, to the extent these items can be properly interpreted without reading the text of the patent. The abstract clearly states that the purpose of the invention is to "to obtain an optical semi-conductor element which can detect only a part of light in an optical waveguide layer and propagate the other light through this layer, by providing a high order diffraction grating which can take out the light satisfying the reflection condition of two or more orders and propagate it through the optical waveguide layer ... ." Significantly, nowhere in this description is there any mention of a tuning section, what the inputs to said tuning section would be, and what

plural wavelengths of light can be absorbed depending on the state of the tuning section. FIG. 1 of *Matsui* appears to be an embodiment of the described device satisfying one Bragg Reflection condition, and FIG. 3 of *Matsui* appears to have three separate Bragg Reflection conditions being satisfied in a cascade configuration. *Matsui* is asserted by Applicants as being indicative of a static photodetector device which, when using a Bragg grating, is tuned to one singular wavelength. In order to extract more than one wavelength, the device of FIG. 3 is used -- where the 18(a) contact emits an absorption current relating to the wavelength selected by the Fiber Bragg grating 14(a), the 18(b) electrical contact emits the photocurrent relating to the wavelength absorbed by Fiber Bragg grating 14(b), and electrical contact 18(c) emits an absorption current relating to the wavelength absorbed by Fiber Bragg grating 14(c). In this fashion three separate wavelengths can be selected out of the incident light 20 and three separate absorption currents can be acquired correlating thereto.

However, in neither the embodiment of FIG 1 nor the embodiment of FIG. 3 of *Matsui* is there disclosed any port for a tuning input. Thus Applicants respectively traverse the Examiner's identification of index Nos. 18 with "a tuning section." If the Examiner would compare the devices of Figures 1 and 3 in *Matsui* with the device of FIG. 1 in the present application (which is an exemplary embodiment of the device of claim 1), the Examiner will see that in FIG. 1 of the present application there is an absorption section 120, and ***in addition to*** this absorption region there is a tuning region 130. *Matsui* teaches no such additional port for tuning, either in the single stage or the cascaded photodetctors. Without a tuning section, it is impossible to tune the Bragg Grating of the devices in *Mitsui* and therefore each grating is inherently and statically tuned to one wavelength, unlike the device of Claim 1.

Regarding Claim 2, for similar reasons *Matsui* cannot teach the device of claim two which is simply the device of claim 1 in a single optical circuit on a common substrate. For these reasons *Matsui* is deficient as a reference against the device against claims 1 and 2.

Claim 5 is directed to a semi-conductor photodetector device comprising a substrate of a first doping type, an undoped region laterally disposed above the substrate, and a grating positioned between the substrate and the undoped region. The device is further provided with a waveguide laterally disposed above the undoped region, and an upper region of a second doping type laterally disposed above the waveguide region, where the waveguide is of a different atomic composition than the substrate the undoped region and the upper region.

The examiner asserts *Mizutani*, in particular FIG. 6 thereof, against the device of claim 5 (although the reference is stated as being *Nitta* -- see second paragraph at the top of page 4 of the Office Action -- the reference numbers clearly identify it as *Mizutani*). Firstly, *Mizutani* is directed to a laser light generator, not a photodetctor. Thus, the physical principles behind the device of *Mizutani* are significantly different from those behind the device of Claim 5 of the present application. Further, Applicants respectfully traverse the Examiner's characterization of the regions [73, 74] disclosed by *Mizutani* as a waveguide. Regions 73 and 74 of Figure 6 are not waveguides at all. Rather, they are active layers each of which is optimized to amplify one of the TE or TM modes of incoming light, which is then propogated forward. They are specifically arranged such that a gain for one type of mode is dominant in each region. Active layer 73 is arranged such that the gain for the TE mode is dominant and active layer 74 is arranged such that gain for the TM mode is dominant.

As well, the Examiner characterizes region 71 as a substrate of a first doping type, and region 76 as an upper region of a second doping type. But this is untrue. Region 76 is not a single region at all; it is a compound region of an Si-doped InP layer and Si-doped InGaAsP cap layer (see col. 11, lines 35-38), whereas region 71, characterized in the Office Action as the substrate, is composed of p-doped InP. Region 76 is not at all describable as being "of a second doping type relative to the substrate."

Because *Mizutani* has a wholly different function (amplification and propogation) than the device of Claim 5, it necessarily has all of these additional components, which its function requires. As a result, in fact, it teaches away from the device of Claim 5 whose different function allows it to have a much simpler structure, easily achievable without any of the complexity of *Mizutani*. To lump multiple dissimilar *Mizutani* regions together and try and fit them into the streamlined structure of the device of Claim 5 is akin to forcing a spider's eight legs into a pair of tennis shoes. The fit is fallacious and contrived.

Given the above, Applicants urge that *Mizutani* does not teach the device of Claim 5, and thus must fail as a reference against it.

Claims 3-4 were rejected under a combination of *Matsui* and *Aoki*. Aoki is directed to an output beam expanded semiconductor laser device. It is not directed to a photodetector. Device geometries are different for the two device types. Applicants submit that the criteria for a ***prima facie*** 35 U.S.C. 103 rejection, as provided in MPEP Section 706.02(j), have not been met, inasmuch, as argued above, there is simply no suggestion to modify *Matsui,* a static Bragg Grating photodetector based on any aspects of *Aoki*. People building photodetectors would not consult a device directed to expanding

the output beam of a laser. Photodetectors generally do not care about light outputting from them. There is certainly no reasonable expectation of success found in *Aoki* for improving the device of *Matsui*. Even if there were motivation to combine and some expectation of success, the combination of *Matsui* and *Aoki* does not teach the unique feature of Claims 3-4, the tuning section, as discussed in detail above.

Claims 5-13 were rejected under a combination of *Chandrasekhar* and *Nitta*. *Chandrasekhar* is directed to the opposite type of photodetector from that of independent Claims 5. Rather than a Fiber Bragg grating device, *Chandrasekhar* is directed to a Fabry-Perot type device. In the system of *Chandrasekhar* the wavelength input into the device of Figure 2 has already been selected by the device of Figure 1. *Chandrasekhar*'s **frequency routing device** – exactly analogous in function to a grating -- is cascaded with its photodiode and HBT (see discussion at col. 2, lines 14-20). It thus has no use for a superfluous grating integrated in the photodiode device shown in Figure 2, which would add cost and complexity without any benefit. Thus, the criteria for a ***prima facie*** 35 U.S.C. 103 rejection, as provided in MPEP Section 706.02(j), have not been met, inasmuch as there is simply no suggestion to modify *Chandrasekhar* to include a superfluous grating. Nor is there any expectation of success in such a concept. A Fabry Perot type device such as *Chandrasekhar* ***ipso facto*** teaches away from a Fiber Bragg grating device, such as that of *Nitta*. Thus, Applicants urge, this rejection must also fail.

Finally, Claims 16-19 were rejected under a combination of *Matsui* or *Mizutani* in view of *Rushing*. As discussed above, neither *Matsui* nor *Mizutani* teaches the device of Claims 1-12. Applicants read nothing in Rushing which would cure the defects of *Matsui* or *Mizutani* as a reference against Claims 1-12. Claim 16 has been amended to recite that the photodetector is the device of any of Claims 1-12. Thus Claim 16, as

amended, is urged as distinguishably patentable over *Matsui, Mizutani* or *Rushing,* whether alone or in any combination.

The other claims in this Application, including new Claim 29, are each dependent from one or another of the independent claims discussed above, and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration or reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

Finally, submitted herewith is a Request for Approval of Drawing Changes. The requested change is the inclusion of Figure 4 in this application, which, although referenced in the specification, apparently was inadvertently not sent in with the initial filing. Figure 4, a block diagram, is described in detail in the specification at the bottom of page 10 and the top of page 11 in the specification, and it is cumulative to that disclosure. Its inclusion is requested so as to make that discussion easier to follow.

The Examiner is authorized to deduct any additional fees believed due from, or credit any overpayments to, our Deposit Account No. 11-0223.

Respectfully submitted,

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DATED: May 3, 2002

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**CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited with the United States Postal service as first class mail, in a postage prepaid envelope, addressed to Box Fee Amendment, Commissioner for Patents, Washington, D.C. 20231 on May 3, 2002.

Dated May 3, 2002

Signed

Print Name Aaron S. Haleva

## EXHIBIT TO AMENDMENT TO INDICATE CHANGES MADE TO CLAIMS

16. (Amended) A system for measuring the optical power and optical signal to noise ratio of optical signals in a data network, comprising:

a photodetector;

a trans-impedance amplifier;

an analog to digital converter; and

a microprocessor;

**where the photodetector is the device of any of claims 1-12**.